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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/811,591

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Donghui Lu

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08/27/2009

INTEL/BSTZ

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EXAMINER

GAMBETTA, KELLY M

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

08/27/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/811,591

**Applicant(s)**

LU, DONGHUL

**Examiner**

KELLY GAMBETTA

**Art Unit**

1792

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 May 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 10, 11 and 21-27 is/are pending in the application.
- 4a) Of the above claim(s) 21-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-8 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent number 6818517 to Maes in view of US Patent publication 2004015845 to Nguyen et al. and in further view of Ohmi et al. (US 6669825)

Regarding claims 1 and 2, Maes discloses applying plasma power to form a film by generating plasma and flowing a deposition gas during the plasma deposition simultaneously or in pulses. This indicates that the plasma is continuously on before and after the flow of the deposition gas. The nitride is deposited and the plasma power is shut off. (Column 5 lines 22-43) Maes does not include this layer as part of a first portion of a layer then repeating this process to form a second layer. Nguyen et al. teaches depositing a first portion of a layer then repeating the process to form a second layer (abstract, Figure 4 and paragraph 0049) during a process that offers advantages over the method of Maes including lower temperature reactions for modern semiconductor processing (paragraph 0004), to deposit films of high coverage on a not-flat substrate such as vias or trenches in semiconductors (paragraph 0010), minimize process time and enhance film quality (paragraph 0049).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Maes to include the nitride layer as part of a first portion of a layer then repeating this process to form a second layer as taught by Nguyen et al. in order to take advantage of lower temperature reactions for modern semiconductor processing, to deposit films of high coverage on a not-flat substrate such as vias or trenches in semiconductors, minimize process time and enhance film quality. Further, Nguyen et al. teaches RF power as a common power source for generating plasma in paragraphs 0008 and 0031. However, Maes teaches a remote plasma generator, whereas the claim now requires initiating the flow of gases into the chamber and then applying the RF power to create the plasma. Ohmi et al. teaches igniting plasma within the chamber

when making a similar film in columns 11 and 12 et seq, for example. Therefore, it would have been obvious to substitute remotely generated plasma with chamber generated plasma because the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. See *KSR International Co. v. Teleflex inc.*

Regarding claim 3, Maes uses silane as a deposition gas in column 5 line 31.

Regarding claim 4, Maes discloses that silane may be pulsed during the nitrogen plasma deposition. One of ordinary skill in the art would recognize the capability of the first pulse or any pulse thereafter occurring at least more than 0.5 seconds after applying the plasma.

Regarding claim 5, Maes includes by reference in entirety US patent 6544900 to Raaijmakers et al. that includes the silane gas flowing through process chamber 12 in Figure 2 before being removed by a vacuum pump.

Regarding claims 6 and 7, Maes discloses using nitrogen and ammonia as plasma gases in column 5 lines 23-46. In addition, one of ordinary skill in the art would recognize that a plasma of nitrogen as disclosed by Maes would not be possible without initiating a gas flow to start the plasma.

Regarding claims 8 and 11, Nguyen et al. discloses purging after each step of depositing parts of the film and depositing parts of the film until the desired thickness, or complete film, is reached, in Figure 4.

Regarding claim 10, Raaijmakers et al. includes a chamber that is equipped to process many substrates (Figure 1) that would include the capability of moving the substrates in between processing steps.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **KELLY GAMBETTA** whose telephone number is (571)272-2668. The examiner can normally be reached on Monday - Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kelly M Gambetta  
Examiner  
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